

11.	<table><tr><th>x</th><th>$f(x)$</th></tr><tr><td>1</td><td>352</td></tr><tr><td>3</td><td>136</td></tr><tr><td>5</td><td>64</td></tr><tr><td>7</td><td>136</td></tr><tr><td>9</td><td>352</td></tr></table>	x	$f(x)$	1	352	3	136	5	64	7	136	9	352
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12.	<table><tr><th>x</th><th>$f(x)$</th></tr><tr><td>1</td><td>25</td></tr><tr><td>5</td><td>85</td></tr><tr><td>9</td><td>113</td></tr><tr><td>13</td><td>109</td></tr><tr><td>17</td><td>73</td></tr></table>	x	$f(x)$	1	25	5	85	9	113	13	109	17	73
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For Problems 13–16, find the indicated function value if f is

- A linear function
 - A power function
 - An exponential function
- Given $f(2) = 5$ and $f(6) = 20$, find $f(18)$.
 - Given $f(3) = 80$ and $f(6) = 120$, find $f(24)$.
 - Given $f(10) = 100$ and $f(20) = 90$, find $f(40)$.
 - Given $f(1) = 1000$ and $f(3) = 100$, find $f(9)$.

For Problems 17–20, use the given values to calculate the other values specified.

- Given f is a linear function with $f(2) = 1$ and $f(5) = 7$, find $f(8)$, $f(11)$, and $f(14)$.
- Given f is a direct-cube power function with $f(3) = 0.7$, find $f(6)$ and $f(12)$.
- Given that $f(x)$ varies inversely with the square of x and that $f(5) = 1296$, find $f(10)$ and $f(20)$.
- Given that $f(x)$ varies exponentially with x and that $f(1) = 100$ and $f(4) = 90$, find $f(7)$, $f(10)$, and $f(16)$.

For Problems 21–24, describe the effect on $f(x)$ if you double the value of x .

- Direct-square power function
- Direct fourth-power function
- Inverse variation power function
- Inverse-square variation power function
- Volume Problem:** The volumes of similarly shaped objects are directly proportional to the cube of a linear dimension.

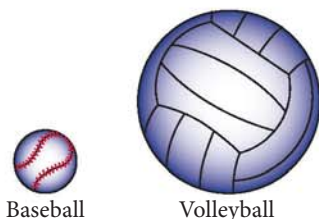


Figure 2-3g

- Recall from geometry that the volume, V , of a sphere equals $\frac{4}{3}\pi r^3$, where r is the radius. Explain how the formula $V = \frac{4}{3}\pi r^3$ shows that the volume of a sphere varies directly with the cube of the radius. If a baseball has volume 200 cm^3 , what is the volume of a volleyball that has three times the radius of the baseball (Figure 2-3g)?
- King Kong is depicted as having the same proportions as a normal gorilla but as being 10 times as tall. How would his volume (and thus his weight) compare to that of a normal gorilla? If a normal gorilla weighs 400 lb, what would you expect King Kong to weigh? Is this surprising?
- A great white shark 20 ft long weighs about 4000 lb. Fossilized sharks' teeth from millions of years ago suggest that there were once great whites 100 ft long. How much would you expect such a shark to weigh?
- Gulliver traveled to Lilliput, where people were $\frac{1}{10}$ as tall as normal people. If Gulliver weighed 200 lb, how much would you expect a Lilliputian to weigh?



Iris Weddell White's illustration The Emperor Visits Gulliver in Jonathan Swift's *Gulliver's Travels*. (The Granger Collection, New York)

- Area Problem:** The areas of similarly shaped objects are directly proportional to the square of a linear dimension.
 - Give the formula for the area of a circle. Explain why the area varies directly with the square of the radius.
 - If a grapefruit has twice the diameter of an orange, how do the areas of their rinds compare?